

REMARKS

Applicant respectfully requests reconsideration of this application, and reconsideration of Paper No. 12. Upon entry of this Amendment, claims 1-32 will remain pending in this application. The amendments to the claims find support throughout the specification and the original claims. No new matter is incorporated by this Amendment.

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In the Office Action, claims 4-26 and 30-32 were objected to as being improper. Specifically, the Office Action indicated that a multiple dependent claim can not depend from another multiple dependent claim. In response, claims 4-26 and 30-32 have each been amended so that each only depends from one claim. Hence, the objection is overcome and its withdrawal is respectfully requested. Furthermore, consideration of claims 4-26 and 30-32 is respectfully requested.

* * *

Claim 1-3, 27-29, and 32 were rejected in the Office Action under 35 U.S.C. § 112, second paragraph, as being indefinite. Reconsideration of this rejection is respectfully requested.

With respect to claim 1, the Office Action sets forth that the terminology “characterised” was indefinite. The Office Action also sets forth that various terms lack proper antecedent basis. In response, Applicant has amended claim 1 to replace “characterised in that” with “wherein” and to ensure that each term has proper antecedent basis. These formalistic changes in no way narrow the scope of the claim. In addition, claim 1 has been amended in a manner that addresses each of the additional issues with respect to clarity indicated in the Office Action.

With respect to claim 2, the Office Action sets forth that it is unclear how the housing relates to the rest of the collection units and whether the collection units are disposed in proximity to the interior of the housing. In addition, the Office Action asserted that the phrase “the interior of said housing” lacks antecedent basis. In response, claim 2 has been amended to no longer recite the language in question thereby rendering this aspect of the rejection moot.

Moreover, Applicant respectfully submits those of ordinary skill in the art would readily understand the metes and bounds of claim 2 as amended.

With respect to claim 3, the Office Action points to various phrases that are asserted to be indefinite. In response, claim 3 has been amended to recite that the system further comprises a housing having means for connection to a flow system, at least one collection unit being located in the housing. Again, those of ordinary skill in the art would readily understand the metes and bounds of claim 3 as presented.

With respect to claim 27, Applicant respectfully submits claim 27 has been amended in a manner that addresses each of the Examiner's concerns.

With respect to claim 28, the word "debris" has been removed from the claim and has been replaced with "said magnetisable material."

With respect to claim 29, Applicant has replaced the phrase "blowing off particles" with "removing said magnetisable material collected." However, Applicant respectfully submits that those of ordinary skill in the art would readily understand the terminology "air line" to mean a source of pressurized air fed through an air line. Hence, Applicant has not changed the language corresponding to this feature of claim 29.

Now turning to claim 32, claim 32 has been amended to replace the terms "material", "debris" and "particles" with the terminology "magnetisable material." The terminology "facing plate portions" has been changed to "facing portions of the plates or plate arrays." In addition, claim 32 has been formatted and amended to recite closing down means for a fluid system supplying fluid to said apparatus."

Accordingly, in view of the above remarks, Applicant respectfully submits that the rejection under 35 U.S.C. § 112, second paragraph is overcome. Reconsideration and withdrawal of the rejection are thus respectfully requested.

* * *

Claims 1-3, 27 and 28 were rejected in the Office Action under 35 U.S.C. § 102(b) as anticipated by Frei (U.S. Pat. No. 2,149,764). The Office Action sets forth that Frei is considered to teach each feature of the claimed invention. Applicant respectfully traverses.

Independent claim 1, from which claims 2 and 3 depend, concerns a magnetic filtration system. Claims 28 and 27 describe a method for removing magnetisable material which employ the system of claim 1. The system of claim 1 includes a plurality of collection units each comprising a magnet and at least two plates or plate arrays disposed on either side of the magnet so that the plates or plate arrays have opposing polarities. The facing plates of each of the collection units have one or a plurality of apertures. Moreover, facing plate portions between the apertures create magnetic flux fields which define one or more collection regions of magnetic attraction and magnetisable material collection, to facilitate collection of the magnetisable material in the collection regions between facing portions. Facing collection regions in each collection unit are disposed between facing apertures such that the magnetic flux fields generated in the collection regions facilitate collection in a volume sandwiched between exposed facing plate portions. Furthermore, the respective plates of adjacent collection units are disposed adjacent to one another so as to substantially restrict the collection of the magnetisable particles to the collection regions.

Frei, fails to teach each and every element of claim 1 and thus can not anticipate the claimed invention. For example, the filter of Frei does not comprise a plurality of distinct collection units as defined in claim 1 of the present application. In Frei, each plate 8 is in contact with one end of each of two tubular permanent magnets 9. Thus each plate 8 forms part of two adjacent “units”, in contrast to the requirement of claim 1 of the present application in which plates of adjacent collection units having like polarity are disposed adjacent one another.

Moreover, in Frei’s device, the assembly of the plates and magnets 9 is surrounded by a tubular magnetizable mesh (see page 1, lines 10-22). Thus, as explained in the passage from page 1, line 48 to page 2 line 7 of the present specification, the magnetic material in the fluid

adheres to the wires of the screens 6 and 7 "which are also magnetized by their engagement with the peripheries of the baffle plates". Thus, it is clear that in Frei magnetizable material is retained by, and built up on, the whole of the surface area of the woven metal mesh. This is completely different from the claimed invention, which calls for the plate arrangement to facilitate collection of magnetizable material in the collection region between facing portions of opposed plates.

The problem with Frei is that as magnetizable material is removed from the fluid flow it is deposited on the wire mesh, with the result that fluid flow is inhibited and, ultimately, prevented by the buildup of such magnetizable material, in common with conventional filters. In other words, Frei' device acts as a conventional filter (see page 1, lines 10-12 "a cylindrical filtering device 5 is mounted comprising a sieve or strainer") whose magnetizable material retention properties are enhanced by magnetizing the filter element. However, all of the fluid being filtered must pass through the filter element, in contrast to the present invention.

In the present invention, the arrangement of the apertures and facing plate portions creates attractive magnetic flux fields which define one or more collection regions of magnetic attraction and magnetizable material collection. Thus, the magnetizable material is caused to collect only in those collection regions. As a result, even when magnetizable material is removed from the fluid, it is retained in the collection regions which are out of the flow of fluid passing though the system and as a result the removal of magnetizable material from the fluid does not inhibit or prevent the flow of fluid as more magnetizable material is extracted from the fluid. In fact, until the present invention is operated for an extended period of time at which the collection regions are completely full, the removal of magnetizable material from the fluid and retention of that material in the collection units does not inhibit or prevent fluid flow from the inlet means to the outlet means.

As mentioned above, in Frei, as soon as magnetizable material is removed from the fluid flowing through the system, it is deposited on the magnetized filter element and immediately begins to have an adverse effect on the flow of fluid through the system. This ultimately could

prevent flow of fluid through the system. Hence, as discussed in detail above, Frei fails to describe each and every feature of independent claim 1.

The above remarks overcome this rejection. Hence, reconsideration and withdrawal of the rejection is respectfully requested.

* * *

Claim 2 was rejected in the Office Action under 35 U.S.C. § 103(a) as obvious based on Frei.

Claim 29 was rejected in the Office Action under 35 U.S.C. § 103(a) as obvious based on Frei in view of Garaschenko et al. (U.S. Pat. No. 5,089,128).

Claim 32/1 was rejected in the Office Action under 35 U.S.C. § 103(a) as obvious based on Frei in view of Taliaferro (U.S. Pat. No. 4,784,762).

These three rejections are addressed together as similar issues apply to each. Moreover, Applicant respectfully traverses all three rejections.

The deficiencies of Frei have been discussed in detail above. Neither Garaschenko nor Taliaferro remedy the deficiencies of Frei. Frei, Garaschenko, and Taliaferro all fail to teach or fairly suggest a filtering system having a plurality of distinct collection units in which plates of adjacent collection units having like polarity are disposed adjacent one another. In addition, None of the three cited patents teach or fairly describe an arrangement of apertures and facing plate portions which create attractive magnetic flux fields which define one or more collection regions of magnetic attraction and magnetizable material collection so as to substantially restrict the collection of magnetizable particle to collection regions. Moreover, the cited prior art fails to provide any motivation to those of ordinary skill in the art to modify described filters by employing the above features of the claimed invention.

The above remarks overcome each of these rejections. Hence, reconsideration and withdrawal of all three rejections are respectfully requested.

* * *

Claims 1-3, 27, and 28 were rejected in the Office Action under 35 U.S.C. § 103(a) as obvious based on WO 97/04873 (WO '873) in view of Frei. Applicant respectfully traverses.

The Office Action asserted WO '873 describes each feature of the claimed invention except connecting together a plurality of collection units. The Office Action further asserted Frei teaches duplicating a magnetic collection unit, connecting the plurality of collection units and placing them in a housing. It was thus concluded that combining the teachings of WO '873 and Frei would render the claimed invention obvious to those of ordinary skill in the art.

Applicant respectfully submits that while WO '873 discloses a magnetic collection unit, as conceded in the Office Action, WO '873 fails to teach or fairly suggest employing a plurality of collection units. Moreover, the WO '873 device which filters fluid by generating fields of magnetic flux that promote collection within a collection region formed between a pair of pole pieces, is completely different from Frei's device which is a conventional cylindrical filter arrangement whose filtering of magnetizable material is enhanced by magnetizing the filter element. In other words, Frei's device works in a completely different manner to the device described by WO 97/04873. Thus, it is believed that a person of ordinary skill in the art would simply not consider combining the two documents in view of the fact that they teach the removal of magnetizable material in completely different and incompatible manners, WO 97/04873 removing material by collecting the material within a collection region formed between a pair of pole pieces based on a magnetic flux arrangement and Frei removing material by means of collecting on a cylindrical filter mesh unit. Given that the two modes of filtration disclosed by WO '873 and Frei are incompatible, there is simply no motivation provided by the two documents to those of ordinary skill to combine the teachings of the two documents as asserted in the Office Action, and this is further evidenced by the different filter arrangement of Frei wherein a single plate 8 forms part of two adjacent "units", as described above relative to the asserted anticipation rejection.

The above remarks overcome this rejection. Hence, reconsideration and withdrawal of the rejection is respectfully requested.

* * *

Claim 29 was rejected in the Office Action under 35 U.S.C. § 103(a) as obvious based on WO 97/04873 in view of Frei, and further in view of Garaschenko et al.

Claim 32/1 was rejected in the Office Action under 35 U.S.C. § 103(a) as obvious based WO 97/04873 in view of Frei, and further in view of Taliaferro.

These two rejections are also addressed together as similar issues apply to both. Moreover, Applicant respectfully traverses both rejections.

The deficiencies of WO '873 and Frei are discussed above. Neither Garaschenko nor Taliaferro remedy the deficiencies of WO '873 and Frei. None of the four prior art documents teach or fairly suggest a filtering system employing a plurality of collection units filters which generate fields of magnetic flux which promote collection as set forth in the rejected independent claim.

The above remarks overcome both rejections. Hence, reconsideration and withdrawal of both rejections are respectfully requested.

* * * * *

Applicant respectfully submits that this Amendment and the above remarks obviate all of the outstanding objection and rejections in this case, thereby placing the application in condition for immediate allowance. Allowance of this application is earnestly solicited.

If any fees are due in connection with the filing of this Request for Reconsideration, such as fees under 37 C.F.R. §§ 1.16 or 1.17, please charge the fees to our Deposit Account No. 02-4300; Order No. 033988.002.

Respectfully submitted,

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LISTING OF CLAIMS

Claim 1 (currently amended): A magnetic filtration system for filtering magnetisable material from a fluid in which said magnetisable material is in suspension comprising:

inlet means; and

outlet means,

~~in which~~ a plurality of collection units (1) is disposed between the inlet means and the outlet means;

each collection unit (1) comprising a plurality of magnet and at least two plates (2,3) or plate arrays disposed one either side of one or a plurality of magnets (4) the magnet so that the plates (2,3) or plate arrays have opposing polarities,

wherein portions of the plates or plate arrays extend beyond part or all of an edge or edges of one or a plurality of said magnets magnet (4), facing plates of each of said collection units have one or a plurality of apertures, wherein facing apertures define a region of magnetic repulsion, and facing plate portions define therebetween, between said apertures create magnetic flux fields which define one or more collection a region regions of magnetic attraction and magnetisable material collection, such that the magnetic flux fields thus created to facilitate preferential collection of said magnetisable material in the collection region regions between facing portions, rather than in the region between said facing apertures, and

wherein facing collection regions in each said collection unit are disposed between facing apertures such that the attractive said magnetic flux fields generated in the collection regions and the repulsive fields dispose either side thereof, facilitate collection in a volume sandwiched between exposed facing plate portions (2,3).

characterized in that and wherein the respective plates (2,3) of adjacent collection units (1) having like polarity are disposed adjacent to one another so as to substantially restrict the

collection of said magnetisable particles to the collection regions ~~substantially within the interior of the collection units.~~

Claim 2 (currently amended): A magnetic filtration system as in claim 1, ~~characterized in that there is provided further comprising a housing (15) made of a non-magnetisable material, to thereby limit magnetisable material collection to the collecting regions within the collection units (1) if the collection units are disposed in close proximity to the interior of said housing (15).~~

Claim 3 (currently amended): A magnetic filtration system as claimed in claims claim 1, to 2 characterised in that there is provided further comprising a housing integral having means for connection to a flow system, said filtration system still permitting fluid flow therethrough, even at contaminant capacity the or each said collection unit being located in the housing.

Claim 4 (currently amended): A magnetic filtration system as claimed in claims claim 1, to 3 characterised in that wherein each collection unit (1) is further separated from an adjacent collection unit (1) by a spacing member (9).

Claim 5 (currently amended): A magnetic filtration system as claimed in claims claim 1 to 4, characterised in that the wherein said spacing member is non-magnetic.

Claim 6 (currently amended): A magnetic filtration system as claimed in claims claim 1 to 5 4, characterised in that the wherein said spacing member is magnetic.

Claim 7 (currently amended): A magnetic filtration system as claimed in claims claim 1, to 6 characterised in that wherein the apertures (6) in respective collection units, which are in closer proximity to the inlet means, are larger than those of units disposed nearer the outlet means.

Claim 8 (currently amended): A magnetic filtration system as claimed in claims claim 1, to 7
~~characterised in that, further comprising~~ alignment means ~~is provided~~ for disposing the apertures
(6) and plate portions (5), in facing plates (2, 3) of a collection unit (1), in substantial axial
alignment.

Claim 9 (currently amended): A magnetic filtration system as claimed in claims claim 4 to 8
~~characterised in that, further comprising~~ further alignment means ~~is provided~~ for disposing the
apertures[[,]] of respective collection units[[,]] in substantial axial alignment.

Claim 10 (currently amended): A magnetic filtration system as claimed in claims claim 4 to 9,
~~characterised in that~~ wherein said alignment means and further alignment means comprise a tab
(11) of given dimension on an internal edge of the plate and an axial unit (8) having a groove
(10) of corresponding dimension to that of the tab (11), into which groove said tab can locate to
provide a chosen axial and radial alignment of the facing plate portions (5) and apertures (6) of a
collection unit (1) and/or those of an assembly of collection units.

Claim 11 (currently amended): A magnetic filtration system as claimed in claims claim 1, to 10
~~characterised in that the magnetic filtration system is further provided with~~ further comprising
flow directing means (14) for directing fluid flow from the inlet means towards the apertures (6)
in said plates (2, 3).

Claim 12 (currently amended): A magnetic filtration system claimed in claims claim 1, to 11
~~characterised in that~~ further comprising slot-like apertures (7) ~~are provided~~ in said apertures (6)
and facing plate portions (5) to further enhance the magnetic flux density between the facing
plates of the or each collection unit.

Claim 13 (currently amended): A magnetic filtration system as claimed in ~~claims~~ claim 1, to-12
~~characterised in that~~ wherein facing pole piece pairs (5) are curved towards one another to
further enhance the magnetic flux fields therebetween.

Claim 14 (currently amended): A magnetic filtration system as claimed in ~~claims~~ claim 1, to-13
~~characterised in that~~ wherein facing plate/plate array pairs (5) are separated by a distance which
best utilises the magnetic flux emergent from the edges of said facing plates/plate arrays to
attract and retain said magnetisable material in the fluid and which also facilitates a required
collection capacity.

Claim 15 (currently amended): A magnetic filtration system as claimed in ~~claims~~ claim 1, to-14
~~characterised in that~~ wherein the attractive flux lines between facing plate portions (5) are
substantially orthogonal to the repulsive flux lines in the apertures (6), such that magnetisable
material entering the apertures, is subject to the influence of both attractive and repulsive flux
fields.

Claim 16 (currently amended): A magnetic filtration system as claimed in ~~claims~~ claim 1, to-15
~~characterised in that~~ wherein internal surfaces of the housing are disposed in close proximity to
the outer portions of the plate/plate array pairs in order to substantially constrain fluid flow in the
filtration system to regions in which magnetic flux fields generated by facing plate/plate array
pairs facilitate the attraction and retention of the size range and type or types of non-
magnetisable particle input to the filtration system, ~~for example, ferrous particles smaller than~~
~~one micron.~~

Claim 17 (currently amended): A magnetic filtration system as claimed in claims claim 1, to 16
characterised in that further comprising one or a plurality of distribution plates (12) have having
further apertures in substantial axial alignment with said plate apertures, which can be with the or
each distribution plate being disposed on either side of one or more of the collection units (4) to
ensure that all fluid is exposed to regions having magnetic flux density similar to, or greater than,
a threshold required for particle attraction.

Claim 18 (currently amended): A magnetic filtration system as claimed in claims claim 1 to 17 2,
characterised in that wherein the housing (15) comprises one or a plurality of sealable sections
with interlockable threaded portions that enable said sections to be readily assembled or
dismantled.

Claim 19 (currently amended): A magnetic filtration system as claimed in claims claim 1 to 18
2 characterised in that wherein the housing (15) is further provided with includes means for
attachment to a fluid system.

Claim 20 (currently amended): A magnetic filtration system as claimed in claims claim 1, to 19
characterised in that further comprising isolation means may be provided for isolating fluid flow
to and from the filtration system to facilitate its removal of fluid flow from and insertion into the
fluid system.

Claim 21 (currently amended): A magnetic filtration system as claimed in claims claim 1, to 20
characterised in that further comprising monitoring means, for monitoring the presence and/or
amount of said magnetisable material collected, is disposed in the filtration system, so that
particle collection and therefore wear can be assessed without dismantling the system.

Claim 22 (currently amended): A magnetic filtration system as claimed in claims claim 1 to 21, characterised in that further comprising system close down means is provided for enabling a system, of which said filtration system is a part, to be closed down if which is actuated upon detection of a pre-determined level of debris material collected is reached.

Claim 23 (currently amended): A magnetic filtration system as claimed in claims claim 1 to 22 characterised in that conventional further comprising a filter media (90) medium disposed in the housing to remove non-magnetisable particles input to the system.

Claim 24 (currently amended): A magnetic filtration system as claimed in claim 1, to 23 characterised in that the magnet or magnets in the wherein at least one of said collection units unit(s) is/are includes an electromagnet(s) (80) having electromagnet and switch means for activating the electromagnet(s) electromagnet to collect particles and for de-activating the electromagnet(s) electromagnet to facilitate release of any particles said magnetisable material collected.

Claim 25 (currently amended): A magnetic filtration system as claimed in claims claim 1, to 24 characterised in that the conventional further comprising cellulose fibre fiber, metal or other filter material is included in the magnetic filtration system to remove non-magnetisable material input to said system.

Claim 26 (currently amended): A magnetic filtration system as claimed in claims 1 to claim 25, characterised in that said conventional wherein said filter material is placed downstream of one or a plurality of said collection units.

Claim 27 (currently amended): A method for removing magnetisable particles from a fluid system in which said particles are magnetisable material is in suspension, characterised in that comprising; the steps include

providing an apparatus as claimed in Claim 1,
passing fluid through said regions of magnetic repulsion apertures, and
attracting and retaining said magnetisable particles in said collection regions of magnetic attraction and repelling particles from said apertures and from between adjacent collection units to thereby further enhance magnetic flux lines within the collection units, even in conditions of high fluid flow and turbulence.

Claim 28 (currently amended): A method as claimed in claim 27 characterised in that the method includes, further comprising the steps of detaching the plates from the magnet or magnets and mechanical removal of debris said magnetisable material from the plates and the magnet or magnets.

Claim 29 (currently amended): A method as claimed in claim 27 characterised in that the method includes, further comprising the step of blowing off particles removing said magnetisable material collected, in an undismantled collection unit/assembly, with an air line.

Claim 30 (currently amended): A method for removing magnetisable particles from a fluid in which said magnetisable material is in suspension, as claimed in claim 27 characterised in that comprising the steps include:

providing an apparatus as claimed in Claim 1 wherein at least one of said collection units includes an electromagnet and switch means for activating the electromagnet to collect particles and for de-activating the electromagnet to facilitate release of said magnetisable material collected,

passing fluid, via a fluid system, through said apertures and attracting and retaining said magnetisable particles in said collection regions providing an apparatus as claimed in claim 24, passing fluid through said apertures,

activating the electromagnet to retain said particles magnetisable material in said regions of magnetic attraction and repel particles from said apertures,

de-activating the electromagnet to release the particles said magnetisable material from said regions of magnetic attraction, and

disposing of particles said magnetisable material from said fluid system.

Claim 31 (currently amended): A method as claimed in claim 30 characterised in that, wherein the method for activating and de-activating the electromagnet includes the step of passing current through coils of the electromagnet.

Claim 32 (currently amended): A method for monitoring the quantity and/or type of debris magnetisable material collected includes comprising; the steps of

providing the an apparatus as claimed in claim 1 or claim 24,

providing detection means for detecting the presence of particles magnetisable material collected between facing portions of the plates or plate arrays plate portions, part of which detection means extends in the collecting collection region of said one or more collection units,

monitoring the type or quantity of said magnetisable material present,

providing alarm means,

setting off the alarm if material the quantity of said magnetisable material rises beyond a pre-determined rate or amount, and

providing closing down means for the a fluid system supplying fluid to said apparatus,

and

closing down the said fluid system if the quantity of said magnetisable material rises beyond a further pre-determined rate or amount.